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DATAMATION

INTERNATIONAL EDITION JULY 1 $3 TECHNICAL PUBLISHING

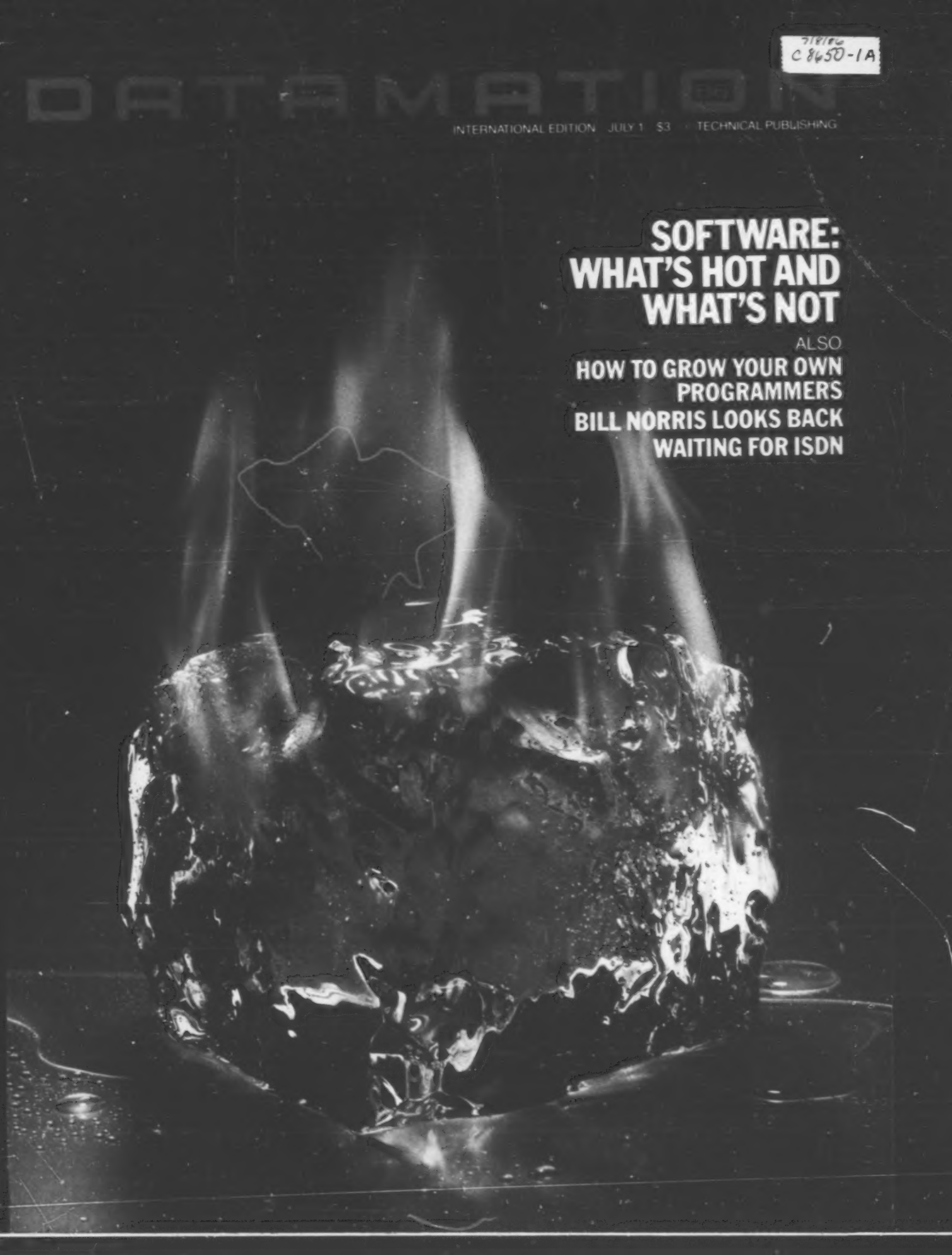
SOFTWARE: WHAT'S HOT AND WHAT'S NOT

ALSO

HOW TO GROW YOUR OWN PROGRAMMERS

BILL NORRIS LOOKS BACK

WAITING FOR ISDN



DATAMATION

JULY 1, 1986/$3 U.S.A.
VOLUME 32 NUMBER 13
This issue, 192,901 copies

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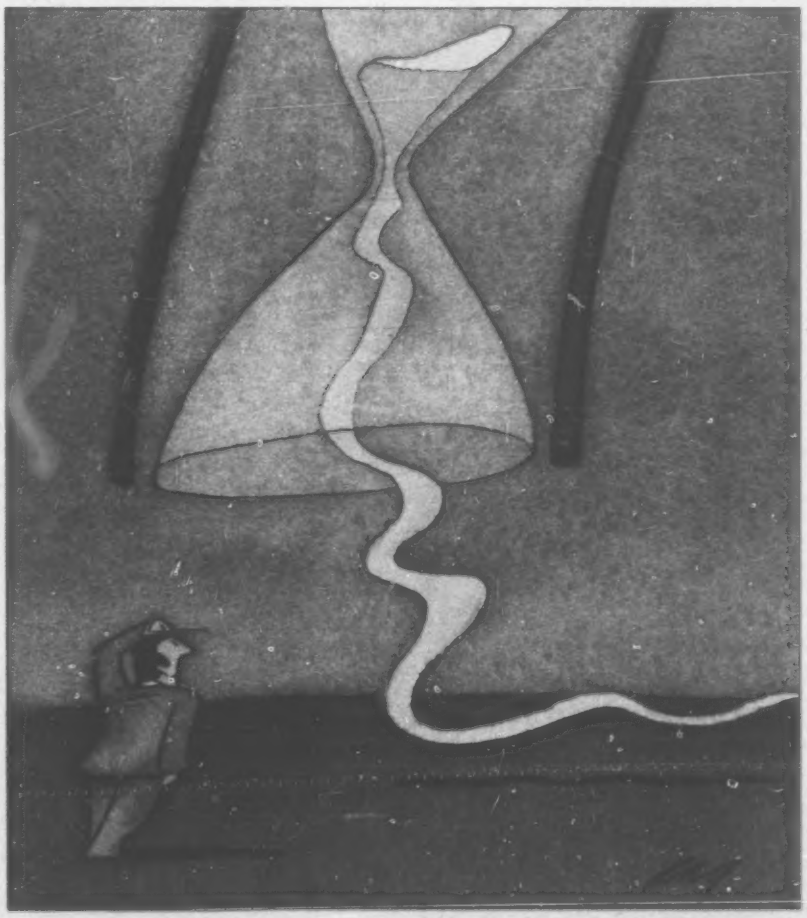

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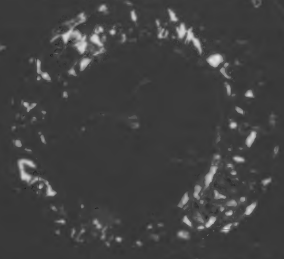

by Hesh Wiener

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■ When it comes to buying software, computer professionals can be as fickle as slot machines and as belligerent as toothaches. Their end users are no longer distant from the minutiae of the data processing shop. They can see the flaws along with the flourishes of computer services though the ubiquitous terminal. This has changed the focus of a computer operations department, particularly where software is concerned.

Software is now a hot medium that serves an interactive community, demanding immediate access to the organization's information resources. Batch processing, the cool medium, has faded. Though the stream of bills, checks, and reports flowing from the central data processing complex has grown ever larger, the terminal is now the focal point of computing.

With so many applications on-line, the functionality, friendliness, and resiliency of software have taken on increased importance. Across the industry, the hot sellers are programs that help the user interact with corporate data, while the packages with sluggish sales are those which do not readily accommodate the growing demands for instant data gratification.

The patterns of program purchases are changing, according to studies by market researcher Computer Intelligence Corp. of La Jolla, Calif. Some software stalwarts are losing favor, and even the most enduring applications are being challenged.

In the real world of bread-and-butter applications—payables, receivables, general ledger, and payroll—the market appears to be wide open. Surveys by Computer Intelligence show that more than 55% of the accounting software now running on IBM mainframes is homegrown, but users continue to buy packages from outside.

Purchases of accounting software seem to increase every

Momentum is difficult to establish and harder to maintain in the software business.

FIG. 1

IBM/PCM MAINFRAME SITE SOFTWARE PURCHASE PLANS

TOP 10 APPLICATION SOFTWARE AREAS

PRODUCT GROUP	PERCENT OF SITES*
Accounts payable	4
Office automation	4
Accounts receivable	3
General ledger	3
Graphics	2
Integrated manufacturing	2
Payroll	2
Personnel	2
Spreadsheet	2
Fixed asset	1

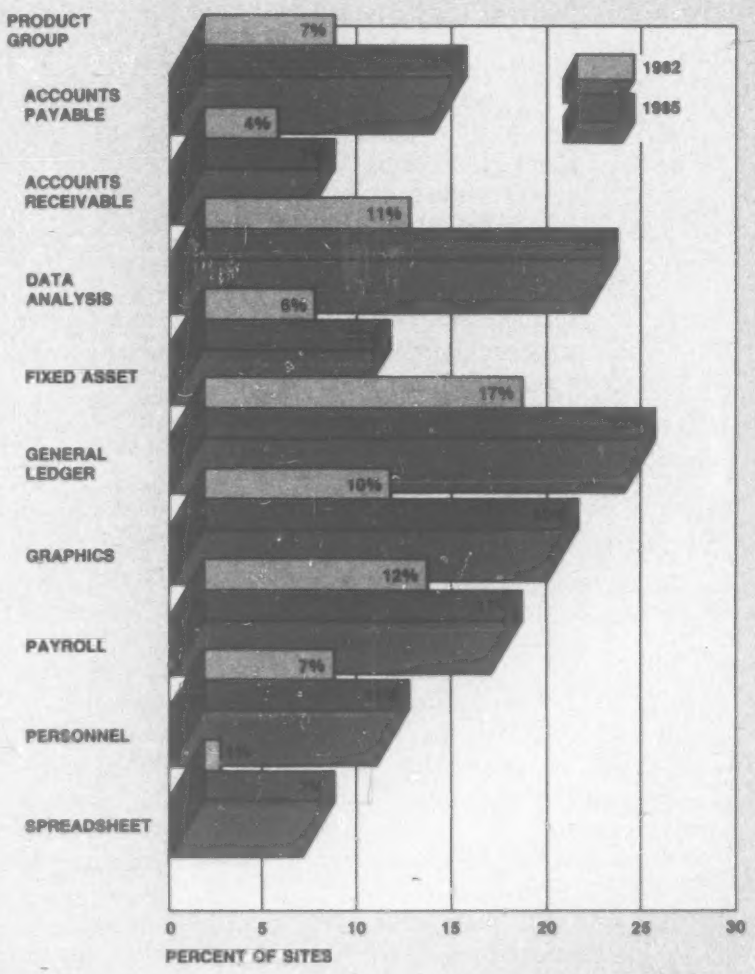
*Percent of sites interviewed during the previous six-month period that were either planning, evaluating, or had on order a product or products within the specified product group.

Source: Computer Intelligence Corp.

FIG. 2

APPLICATION SOFTWARE WITH COMMERCIAL PACKAGE

IBM/PCM MAINFRAME SITES



Source: Computer Intelligence Corp.

year. Changing tax and reporting requirements, shifting economic conditions, and the insatiable curiosity of accountants can be satisfied only by increasingly sophisticated and flexible software packages. Payables, receivables, general ledger, and payroll programs from Atlanta-based Management Sciences America—the leader in this submarket—as well as those from McCormack & Dodge, Software International, and, increasingly, Cullinet are taking business away from IBM, which once led the field and is now in second or third place. But, even MSA holds only 11% or 12% of the base, while McCormack & Dodge, Natick, Mass., boasts a 9% share. IBM has only 2% of the accounting and general ledger markets; Cullinet has about 1.5%.

The dispersion of this market among many vendors makes it hard to cite all the products gaining or losing position in the crowd of suppliers. The very number of contenders makes for a fast race.

When Computer Intelligence asked users which applications areas they were considering for software expansion (including packages that were planned, being evaluated, and on order), accounts payable came out on top with a 4% response. Accounts receivable and general ledger each got a 3% response, and payroll was cited by 2%.

VENDORS FOLLOW IBM'S LEAD

IBM mainframe sites, for the most part, already have accounting programs in place, of course. So the percentages turned up by this canvassing show that there is great mobility within the user base.

The leading vendors in the IBM and compatible market frequently migrate their established products to other machines. This enables users of non-IBM mainframes and of most popular minicomputers to share the pool of experienced applications programmers that has grown around the leading IBM-oriented packages. In addition, some vendors—Sperry, Burroughs, and NCR, for instance—have followed IBM in offering their own basic accounting software. Others—Digital Equipment Corp. among them—actively encourage the development of program products by independents.

There are a host of office automation and electronic mail applications being implemented on multiterminal systems these days. In addition, there appears to be

FIG. 3

DBMS SOFTWARE MARKET SHARE AMONG IBM/PCM MAINFRAME SITES

SUPPLIER/ PRODUCT	YR. END—1982		YR. END—1983		YR. END—1984		YR. END—1985		MARCH 1986	
	#SITES	%SITES	#SITES	%SITES	#SITES	%SITES	#SITES	%SITES	#SITES	%SITES
ADR										
Datacom/DB	131	3	181	3	290	5	380	5	406	6
CCA										
Model 204	33	1	54	1	89	1	112	2	114	2
Cincom										
Total/TIS/Supra	438	10	494	9	534	8	546	7	547	7
Cullinet										
IDMS & IDMS/R	486	11	633	12	855	13	1,043	15	1,104	15
IBM		59		56		49		47		46
DB2	0	0	1	0	15	0	81	1	109	1
DL1	1,466	34	1,651	31	1,528	24	1,506	21	1,470	20
IMS/DB	1,018	24	1,231	23	1,415	22	1,455	20	1,458	20
SQL/DS	60	1	138	3	230	4	336	5	365	5
Info Builders										
Focus	160	4	298	6	552	9	669	9	682	9
Martin-Marietta										
RAMIS II	113	3	154	3	244	4	279	4	285	4
SAS Institute										
System 2000	82	2	102	2	114	2	114	2	113	2
Software AG										
ADABAS	241	6	332	6	418	6	451	6	456	6
Other*	61	1	88	2	158	3	219	3	228	3
TOTAL PACKAGE SITES SPECIFIED	**4,289**	**100**	**5,357**	**100**	**6,442**	**100**	**7,191**	**100**	**7,337**	**100**
Total unique sites with comm. package	3,626	40	4,379	46	5,079	50	5,483	51	5,677	52
Total unique sites in-house developed	122	1	168	2	202	2	201	2	209	2
Sites without DMBS	5,415	59	5,047	53	4,972	48	5,103	47	4,931	46
TOT. IBM/PCM SITES (CI DATAFILE)	**9,163**	**100**	**9,594**	**100**	**10,253**	**100**	**10,787**	**100**	**10,817**	**100**

*Includes: Boeing (RIM), Computer Associates (CA-Universe), D&B Computing (Nomad2), Henco (Info), IBM (Vandl), Infodata (Inquire), (IQ/Net), Nixdorf (NCSC/DB), Oracle (Oracle), Seed (Seed), Sir (Sir/DBMS)

Source: Computer Intelligence Corp.

a real need for text retrieval systems that can work on networks. The linkage of office support programs with IBM's DISOSS (for MVS systems) and PROFS (for machines running VM) appears to be only a beginning, and not necessarily an auspicious one.

Even among the bluest of IBM mainframe users, DEC has attracted office automation users with its All-In-1 product; other mini makers, including Data General, provide versatile packages. Some of the non-IBM systems seem to be easier to integrate with SNA and IBM's other solutions.

In addition to applications ultimately hosted by mainframes, manufacturers of midrange systems, well-armed with user-efficient software, have successfully gone after standalone or turnkey applications. The mini makers appear to have targeted the markets once largely controlled by IBM with its System/34 and 36, and, more important, Wang Labs with its several versatile small computers. Independent software packages for office automation have not yet made much of a dent in this market.

CAD/CAM, MRP, and other applications areas geared to manufacturing companies will continue to grow in importance. IBM has backed CADAM for its automated design users, while DEC's base seems to be dispersed among the offerings of several independents led by Intergraph and McAuto. The MRP software race won't be decided any time soon. CIM applications are just starting to hit the street, their vendors hoping that GM's MAP protocol standard will increase user interest.

Some market battles have been raging for years. The most hotly contested large-system DBMS market is that for IBM mainframes. More than a dozen significant vendors offer products for the big IBM boxes. Market shares can change substantially in a relatively short time, not so much because users abandon established systems, but because new applications require the use of newer software. One of the big changes in the market has been the growing acceptance of relational DBMS programs and the consequent reduction of user interest in older hierarchical packages.

The decline in IBM's share of the DBMS market reflects the new popularity of relational DBMS programs. IBM seems to have pegged its hopes for the DBMS business to relational DB2, a late bloomer but nevertheless a program that many users have to

Artificial intelligence software could well be the key to applications generation.

THE PC PACKAGE MERRY-GO-ROUND

Professional artist and semipro nightclub character Andy Warhol is said to have described the modern era as a time when everybody will be famous for 15 minutes. He might have had a vision of the pc software business, where nearly all the vendors have had, at most, one successful product. Even Lotus, the richest of the software industry's micro moguls, with both of its big successes in the satin spreadsheet arena, is still playing a one-hitter. Microsoft and a few others are the exceptions—fluorescents to the industry's many flashbulbs.

In March, Curt Monash, the software industry analyst at Paine Webber, assembled a panel of experts to review the state of the program product trade. Monash's report on the gathering emphasized that "many panelists believe that the proliferation of pcs represents a significant shift in the balance of power from data processing departments to users, with the result of end users getting more involved with software purchasing decisions."

If this observation is correct, dp departments will have to stay on top of pc program trends in order to maintain companywide standards. This may prove difficult, as there are dozens and dozens of micro software companies, each with one or more products. Many, if not most, of these programs were written with the business user in mind. Fortunately for the computer professional, the current leaders in the most important submarkets are relatively easy to spot.

If it's a spreadsheet, for instance, there's nothing that can touch 1-2-3, any more than another micro software house could match Lotus's $225 million-plus annual revenue. Estimates of the Lotus market share vary, but they hover around 65% of the corporate pc user market, a figure that must sorely tempt Microsoft. Some observers say that Microsoft's Excel isn't really aimed at 1-2-3, but at Symphony, a 1-2-3 cousin that Lotus positions as a distinct product. For the corporate user, Symphony may not be an issue; Lotus still hasn't upgraded most 1-2-3 version 1A users to 2.0, let alone gotten them to learn to use an even more complicated tool kit.

If it's communications software, the leader is probably Microstuf's Crosstalk, but data in this market are not consistent. A Tallahassee, Fla., upstart, Softklone, has started horning in on Crosstalk's customers with its Mirror product. Modem magnate Hayes has done well with Smartcomm. And Microsoft (again!) is hoping to make a dent with its Access program. Most pundits agree that the micro DBMS market is a lot simpler to follow than other sectors. They all say that Ashton-Tate, with its dBase II and III lines, is numero uno, while second place is held by Microrim with its Rbase series. But after that, it's anyone's guess.

Word processing may turn out to be IBM's game. Now that the Displaywriter is dead, PCs are frequently haunted by its ghost, the Displaywrite program. Multimate's software, a micro takeoff on Wang's word processing, is probably number two after IBM's product.

But there's change in the wind, caused, in large measure, by the growing popularity of laser printers, principally those from Hewlett-Packard and Apple. Getting the most out of laser printers means handling proportional typefaces and elementary type composition such as multicolumn layouts. Word Perfect Corp.'s offering and Microsoft Word are said to be the favorites of the micro press lords.

With all the hubbub about relatively new products, it is easy to ignore MicroPro's WordStar, which led the market for years and is still very important. For the past couple of years, WordStar has been influential more by virtue of its installed base than because of its growth. Lately, it has undergone extensive renovation in a renewed bid for leadership.

Other hot sellers are the little programs that save time. For the memorandum writers, there are spelling checkers (increasingly included in high-end word processors), the most popular of which is probably The Word from Oasis Systems, and the most powerful of which is probably V-Spell from Compuview.

There are also the packages nobody talks openly about, used to make extra backups of ostensibly copy-protected software, programs like Copy II PC. These dandies are the perfect adjunct to a vintage IBM PC AT, the one with the hard (to trust) disk.

—H.W.

take seriously. The installed base of IBM's mainframe DBMS packages has risen since the end of 1982 to 3,400 from 2,500, a 36% gain, according to detailed surveys conducted by Computer Intelligence. During the same period, however, the total population of DBMS packages on IBM and compatible mainframes soared 71%, from nearly 4,300 installed program products to more than 7,300. IBM's share of the base has fallen from 59% to 46%. Some observers, such as Curt Monash, analyst at the brokerage firm of Paine Webber Inc., New York, believe IBM's share of DBMS sales may have fallen to as low as 20% of new installations in 1984, before the company began to get DB2 and other relational offerings out the door.

DL/1 is the most popular package for the IBM mainframe shop by number of installations. In fact, 43% of its DBMS user base consists of DL/1 sites, machines running DOS family operating systems. The total installed base of DL/1 has been falling since 1983, and now numbers approximately 1,470 sites, down 11% from a high of 1,651, according to Computer Intelligence. DL/1's loss of market share has been even more dramatic. In 1982, DL/1 accounted for 34% of the IBM and compatible mainframe DBMS packages installed in the U.S. Today it garners only 20% of the market.

The strongest non-IBM products in the DOS environment, Cincom's Total/TIS/Supra family, are also losing market share. They now hold a 7% slice, down from 10% of the relevant market. Unlike DL/1, however, Cincom's base is still growing in absolute numbers.

The wealthiest IBM customers with large databases and more powerful systems to support under the MVS/XA and VM operating systems have increasingly been going to independents for software. IBM's large system DBMS leader, IMS, still has the largest acceptance in the market, but the gap is being closed. IBM not only has lost its former majority position in this lucrative sector, but could conceivably lose its leadership as well.

In 1982, IBM had, with 1,018 users, 24% penetration of the relevant market. By March of this year, that slice had dwindled to 20%, although the number of installations had risen to 1,458.

This trend will continue, since users generally are not looking for more flexible software for new applications. Users will maintain their IMS applications and will occasionally add new ones, putting IMS on a relative handful of systems. (The base grew by only 43 sites between December 1984 and March 1986.)

The obsolescence of IMS has come about through IBM's own research into database systems, and the company's introduction of relational successors, such as DB2, first shipped in volume last year. DB2's base is only now getting big enough

The user bases for non-IBM mainframes are considerably smaller than that for the IBM boxes.

FIG. 4 -

PC SOFTWARE PLANS TO PURCHASE

MOST FREQUENTLY MENTIONED AREAS

PRODUCT GROUP	PERCENT OF SITES PLAN, EVALUATE, ON-ORDER
CAD/CAM	8
Graphics	7
Project management	7
DBMS	4
Office Automation	3
Micro/mainframe (Host)	3
Financial modeling	2
Micro/mainframe (PC)	2
Spreadsheet	1

Source: Computer Intelligence Corp.

to make it a mainstream product; Computer Intelligence has identified only about 150 installations of the package. Analyst Curt Monash suggests the slow takeoff of DB2 should not be misinterpreted by users; he believes that IBM has a strong product here, one that could gobble up more than half the market.

Cullinet, with its IDMS and IDMS/R, is IBM's most serious contender in the large mainframe DBMS market. IDMS/R, a relational product, still accounts for only about 10% to 15% of the IDMS base, although it is of increasing importance. The IDMS product line now holds a 15% market share with 1,104 installations, the result of steady growth from its year-end 1982 share of 11%, or 486 sites. Others are also making inroads into this increasingly competitive market. Focus, from Information Builders, for example, could be a rising star, with 682 installations, or 9% of the market.

The IBM and compatible mainframe DBMS market has lots of room to grow. The 5,677 sites with commercial DBMS packages and 209 sites with homegrown programs identified by Computer Intelligence in its software study comprise only 54% of 10,817 IBM and compatible mainframe sites surveyed. The remainder of the base reports that no major DBMS is currently installed. Once a DBMS proves out, however, others may be brought in. The 5,677 DBMS users surveyed have installed 7,337 packages, or about 1.3 per site. That means the market potential of DBMS could be larger by numbers than that for mainframes, particularly if some DBMS grew to become a strategic adjunct to the operating system.

Beyond the IBM mainframe world, the DBMS market is sometimes a captive one. Burroughs mainframe users almost universally run their hardware suppliers' DMSII software. At Sperry the picture is similar. Users of Sperry's 1100 series mainframes overwhelmingly prefer Sperry DBMS software to that supplied by independents; research data show that 88% of Sperry's users' DBMS systems come from the vendor. Most of the rest use versions of System 2000, from SAS Institute, Raleigh, N.C.

NCR and Honeywell mainframe users, by contrast, depend on versions of Cincom's Total more than any other DBMS package; here the computer maker has cooperated, rather than competed, with the software industry. By forging special relationships with Cincom, the mainframers have avoided the costs and risks of developing their own DBMS packages, while Cincom has been assured of a profitable and captive user base. The user gains too, because the pool of Total programmers is far larger than that which would form around an NCR- or Honeywell-specific package.

The most dramatic battle for DBMS market share is shaping up in the VAX base. According to Computer Intelligence, which puts special emphasis on tracking Digital Equipment, DEC's own software offerings—DEC DBMS, Datatrieve, and RDB—together account for more than 68% of the total installed base. Digital's present market dominance notwithstanding, the score of contenders for market share promises to be a source of change. The present success of DEC's superminis—which overlap IBM's

A DIFFERENT VIEWPOINT

Another perspective on users' spending for applications software can be found in the DATAMATION/Cowen & Co. 1986 Computer/Telecommunications Industry Survey, tabulated early this year (see "1986 Mainframe Survey," May 1, p. 67). Some 2,600 qualified responses from IBM and compatible mainframe sites show continuing changes in how applications are being built.

The survey found that approximately 61% of users' spending for unbundled mainframe software goes for systems packages and 39% for applications packages.

Asked what percentage of their organizations' annual dp budgets goes for unbundled software (applications and systems packages) from IBM and other suppliers, users indicated that IBM gets 61% of their total software spending. This figure continues a downward trend that began in the 1982 survey, when the comparable figure peaked at 67%.

In 1982, 55% of the respondents said that spending on in-house staff was the fastest growing portion of their applications software budget. That percentage has now declined to 47% in the dp shops surveyed. An equal percentage of the respondents are increasing expenditures on packaged software more than anything else in their budgets for applications software.

For the second year in a row, a decline was detected in the backlog of applications waiting to be implemented by these mainframe sites. Asked how many months would be needed for present staff to implement all currently planned applications, 24% of the respondents said less than 12 months. In last year's survey, the comparable figure was 22%, up from 18% the year before. The number indicating that their backlog stretched more than 24 months into the future has declined to 34% this year from 45% in 1982.

The longstanding trend of increasing use of packaged software is flattening out, according to the survey. In 1985's survey, half of the users said they would use prepackaged code; only 47% said so this year. This seems to signal a reversal of a trend that began in 1982, when only 38% of respondents went for packaged software. Packaged software was found to eat up 10% of the average dp budget at these mainframe sites.

Users were also asked about their use of packaged personal computer software. The packages most used were, in order, Lotus 1-2-3, IBM Displaywriter, Ashton-Tate's dBase, and Micropro's Wordstar. Among the packages showing the fastest expansion among this sample of mainframe users were IBM's Topview and Displaywrite, with imputed population growth rates of 14% and 6%, respectively. On the whole, however, just as the corporate pc hardware market is showing signs of saturation, so is pc software. For instance, about 73% of the responding sites had 1-2-3 installed at the time of the survey, but only 3.5% of the sites planned to acquire additional copies. Initial acquisitions of the spreadsheet package were contemplated in only 6.4% of the sites during 1986-87.

—John W. Verity

IBM may have the last word in the remote terminal market, but it has not yet spoken coherently.

smaller mainframes in performance—adds to the frenzy.

Ingres, sold by Relational Technology Inc. of Alameda, Calif., with 8% of the VAX and MicroVAX base, is ahead of DEC's RDB package (with its 5% share) and nearly as popular as DEC's DBMS (9.5% share). Third in line is the eponymous program product from Oracle, Menlo Park, Calif. (5% share). Intergraph's DMRS and Bolt, Beranek and Newman's RS/1 are tied behind Oracle. More than two dozen other offerings, only a few of them now significant, follow these leaders into the fray.

While only the leading independent packages currently enjoy nutritional slices of the market, the vast size of the base alone is enough to engender significant competition. Various industry estimates put the North American VAX census at 16,000 to 20,000 systems, and growing.

Digital has enlarged its hardware base rapidly of late. Numerous systems are used in CIM applications where a DBMS is important, if not vital. Industrial networks, transaction-oriented business systems, and CAD hosting applications all beckon databases, particularly relational ones that can more easily handle unanticipated aggregations of data.

Interest in DBMS software among DEC users is relatively recent, particularly in comparison to DBMS usage among IBM mainframe users. This means that software houses won't have to face the customer resistance that is typically associated with database conversions. In the end, VAX systems, by virtue of their late arrival on the DBMS scene, may well boast the most interesting and powerful database programs in the industry.

Graphics programs are also hot, and the market is teeming with contestants. The leader by a nose in the IBM mainframe environment is the creator of SAS/Graph, SAS Institute, which supplied more than 43% of the 2,600 presentation graphics packages turned up in Computer Intelligence surveys. IBM's own GDDM ran second, with 41.5% of the base, while products from San Diego-based Issco, together representing more than 13% of all graphics packages cited by respondents, were a distant third.

One of the problems users have with graphics packages is the dispersion of data and resultant images across networks. IBM's programs work in all-IBM networks, but don't run on DEC or other non-IBM minicomputers. Nor does IBM's software adequately support plain IBM PCs or compatibles. The upshot may be a movement toward independents in general, and toward SAS Institute and Issco in particular. Both these companies are trying to keep their graphics software offerings as machine independent as possible by offering user-compatible and data-compatible versions for many operating environments.

Among DEC VAX users, DEC, with a nearly 24% market share, is the top graphics software provider, but Issco, with a 19% market share, is the most significant independent. SAS, the leading independent in the IBM market, has a smaller market share in the VAX world, less than 10%. ◉

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The pace of software acquisition activity has become increasingly frantic.

THE ART OF SOFTWARE TAKEOVERS

by Gail Collins

William Goodhew, president of Peachtree Software, likes to compare the software business to crabgrass. That's right, crabgrass. Since it doesn't cost much to enter the business, just about anyone with an idea and a kitchen table can start a software company. While many startups are eventually taken over, new ones keep popping up. Says Goodhew, "It's just like crabgrass: I may pull a whole lot out, but a whole lot more is going to grow right back in overnight."

Acquisitions have been standard fare in the software industry since its earliest days. Recently, however, the pace of activity has become increasingly frantic. The ADAPSO/Broadview index of mergers and acquisitions of software and computer services companies listed 203 deals worth $2.5 billion last year, up from 87 deals worth $1.4 billion five years earlier.

As the number of deals has increased, the nature of the deal-making has changed. The conventional wisdom that the value of a software company rests mainly in the creativity of its people is being reassessed, and the ultimate success of some acquisitions is coming under scrutiny. Some question whether a small, entrepreneurial operation can operate successfully under the wing of a large, bureaucratic company.

To many industry observers, however, all this acquisition activity is nothing but good. It's made possible by the wellspring of software startups, which, according to ADAPSO head Jerome Dryer, "is a strength of the industry." Adds George Grodahl, a partner of Broadview Associates, "We're constantly amazed by the companies we trip across making $7 million to $10 million that we've never heard of before."

One reason behind all this acquisition activity is that small companies often lack the resources necessary to fund their growth. "The barriers to entry are pretty low," says Grodahl. "If I have an in-depth knowledge of the industry application area, I can develop a package. I may even know the area well enough to know exactly where to go to make the initial sale. I can do all that on a shoestring.

"I can bootstrap myself up through obvious phases of development. But I get to a point where I need that marketing capability.

This is the positive side of mergers and acquisitions—providing a little guy with the cash, the expertise, and the helping hand necessary to break into the big time. Software customers are also beneficiaries since they can rest assured knowing that the company that produced their software is part of a substantial organization and is not likely to close up shop and vanish overnight.

NEGATIVE SIDE OF MERGERS

But some companies don't want to be bought. Fearing they'll be a target and figuring a good offense is the best defense, they may join the fray. The result? Deals for deals' sakes, bad matches, inappropriate management, and an unstable environment that does not nurture product development.

Already, the frenzied buying activity has begun to erode the old notion that a takeover has to proceed gently lest the real value of the business decides to walk out the door once the purchase is completed. Talk of "neutron bomb acquisitions" in which only the property is left standing may be hyperbole, but, as Peachtree's Goodhew notes, "it's pretty extreme vocabulary for a business where everybody used to go into an acquisition talking about 'empathy.' "

The hostility shown last year in the deal struck between Dallas-based Sterling Software and Informatics, Woodland Hills, Calif., is cited as an example of the new realities of software acquisitions. Informatics chairman Walter C. Bauer lost a fight for control of his company. After trying to make a management buyout, he was rebuffed by his board of directors in favor of Sterling Software's higher bid.

Bauer acknowledges the new trend. Now chairman and chief executive of Delphi Systems, he says, "Gradually, people in the industry are recognizing there are intrinsic values to an organization: proprietary software, business know-how of a proprietary nature, and good will." (Ironically, Bauer demurs on the amount of hostility involved in the Informatics takeover. The ultimate in unfriendliness, he claims, "is when you tender for stock. Nobody's done that yet.")

Like an acquisition in virtually any industry, Sterling was after Informatics' assets, and willing to pay the price. Sterling "knew there was underlying value—some of the businesses could be managed better, some could be spun off, costs could be trimmed," says Broadview's Grodahl.

Charles Frumberg, a computer industry analyst at Mabon Nugent & Co., a New York brokerage firm, agrees: "A large part of the play was [Informatics'] balance sheet."

The fact that Sterling's stock soared after the deal may encourage more aggressive takeover practices in the future. "People were overemphasizing the idea that you couldn't do a hostile takeover," says William Miller, an analyst at Legg Mason, a Cleveland-based brokerage firm. Miller adds, however, "You can't be indifferent to the people. It depends on what you're trying to buy." Future acquirers, he says, will still have to be careful they don't drop a neutron bomb by mistake: "You don't want to pay for people and get only products."

Despite the Sterling-Informatics fight, many in the mainframe software business are still wary of dragging their acquisitions to the altar. Jericho, N.Y.-based Computer Associates, for example, an active shopper in the merger market whose name has occasionally been linked to the neutron bomb approach, says it still subscribes to the buy-the-people doctrine. "In every one of our acquisitions we've let people go—those who were duplications of people we already had," says David Tory,

ILLUSTRATION BY DANIEL MAFFIA

FIG. 1

THE TOP SOFTWARE DEALS OF 1985

Ameritech buys ADR	$215 million
Sterling Software buys Informatics General	$126 million
Lockheed buys Metier Management Systems	$125 million
Information Resources Inc. buys Management Decisions Inc.	$38.5 million
Systems Designers Intl. (U.K. based) buys Warrington Associates	$26 million
Computer Associates Intl. buys Top Secret product from CGA	$25 million
Ashton-Tate buys Multimate Intl.	$22 million
Data I/O buys Futurenet	$20 million
Hewlett-Packard buys Caricor Inc.	not disclosed
Equitable Life Assurance buys Advanced Systems Applications	not disclosed

Source: Broadview Associates, Fort Lee, N.J.

vice president, planning. "But in every case the core, main technology we were acquiring was in the people. We're not interested in property—we're interested in people."

John Imlay, ceo at Management Sciences America (MSA), Atlanta, agrees. He believes that the emphasis has to be on people because the business "requires a great deal of service and people-knowledge. What you're buying is people's talents."

It's natural for MSA to make acquisitions, he explains, because "we buy products to fulfill different needs of the same customer." When MSA needs a product, Imlay says, "we normally would buy the whole company—you get sales, service, customers, crews, development people."

To illustrate MSA's approach, Imlay points to the decision made in the early '80s to sell a complete line of software for the company's manufacturing clients.

To carry out this idea, MSA first bought manufacturing software producer Arista, Winston-Salem, N.C., from Xerox in 1981. Then, in 1983, MSA bought Computeristics, a Hamden, Conn., firm that created software for order processing.

Both Arista and Computeristics now have their administrative functions performed by MSA but "all the development people have been kept intact," Imlay says, and still work in their old home bases. The turnover among development people has been less than 12% since the acquisitions, Imlay estimates.

As long as MSA stuck to the business it knew best, its acquisition strategy worked. But MSA became a little careless when it bought Atlanta-based Peachtree Software in 1981—an error that cost both companies dearly.

IT SEEMED TO BE A FIT

MSA entered the agreement mistakenly assuming that selling software for micros would be the same as selling it for mainframes. But as time passed, it became clear that Peachtree's product had to be sold like the rest of micro software—through traditional retail distribution channels.

The much-touted fit between the two companies became less comfortable. "Even though MSA sold accounting systems and Peachtree sold accounting systems—it was sort of like one guy sold blue ballpoint pens and one guy sold blue cars," says Goodhew.

Worse, Peachtree had fallen into the same trap MSA had. Seeking that ever elusive synergy, it had acquired two educational software companies in 1983, Eduware and Designware. The idea behind the acquisitions was to use the strength of the Peachtree name to market the two smaller companies' products. But the result, Goodhew explains, was like the famous story of Life Saver chewing gum. The name might be well-known, but it just didn't connect with the product.

MSA sold Eduware and Designware to Encyclopaedia Britannica and Peachtree to Intelligent Systems, a Norcross, Ga., holding company that owns a number of micro-related businesses. The prices were not disclosed, but MSA did take a $13 million loss on the micro debacle in 1985.

Goodhew used to believe that Peachtree could not afford to have all its eggs in the accounting basket. But now his philosophy is the opposite: "Put all your eggs in one basket, and then take *very* good care of that basket," he declares.

Acquisitions and divestitures have become a corporate life-style at many companies. Dallas-based Uccel, for instance, bought six companies on the Broadview list in 1985. "We've been more active than we thought," said Peter Barris, director of acquisitions, when the list was read to him.

Uccel, Barris says, is taking itself apart and rebuilding in a new image. On Jan. 1, Uccel sold its mainframe accounting business to Global Software for an undisclosed price. That business, Barris says, did not mesh with its new strategy of sticking to mainframe banking application software. At the same time, however, Uccel spent $3 million to buy ISA, maker of the micro accounting program Harmony. Barris says the deal was a "product acquisition." Harmony was given to Uccel's micro software company, Open Systems, and ISA was dissolved.

OUTSIDERS NOW BIG BUYERS

The emergence of "outsiders" as big buyers of software firms is another trend that has emerged as the pace of acquisitions has increased. The 1985 ADAPSO/Broadview Index showed a record 23 companies outside the industry making their first acquisition in the software industry. "The most significant new category of acquirers was Bell operating companies," says Grodahl.

The $215 million acquisition of Applied Data Research by Ameritech is probably the most widely discussed deal in this category. Besides Ameritech and ADR, Grodahl points to Continental Telecom's $32 million turnkey purchase of Northern Data Systems and NYNEX's purchase of Data Group for an undisclosed price.

But even more notable, perhaps, are the wealth and diversity of smaller acquisitions by noncomputer firms. Banks and insurance companies have been among the biggest players. Philadelphia-based Cigna, a major insurance company, has been one of the year's busiest shoppers, buying four firms, including Dyer, Wells & Associates, Atlanta, a maker of human resource software.

Legg Mason's William Miller thinks the outsider theory has been oversold. The bulk of the companies doing the buying "are not really noncomputer companies. I'd be surprised if McDonald's enters the market, but a GM, an Ameritech—the fit isn't bad. There's obviously a need for computer sophistication across a wide variety of companies."

Indeed, most of the new corporate acquirers are already major software users who understand their way around a computer. But their corporate cultures are very different, and the problems of adjustment are not mitigated by the fact that all sides can use a similar technical vocabulary.

The noncomputer companies' motives for the purchases are varied. Some of the deals appear to be mere product acquisitions, and some pure investments. But most corporate buyers claim to be on a quest for the Holy Grail of synergy—a fit of needs and resources that make both acquirer and acquiree stronger together than they were apart.

Cigna, for instance, needed software to organize flexible benefits packages, the popular new wrinkle in employee benefits

Can a small, entrepreneurial operation operate successfully under the wing of a large, bureaucratic company?

programs that allows a firm's employees to choose from a "cafeteria" of health programs and other benefits. The insurance company's own product was manually organized and unsophisticated. To stay competitive, Cigna felt it needed to offer a more comprehensive plan that could provide a dozen or more benefit options, payroll deductions, yearly reenrollment, and the ability to trade in vacation days for cash.

The question was whether to develop the software in-house, or purchase a company like Dyer, Wells, whose product, now named Flextrax, offered the organizational components Cigna was seeking. Travers Wills, senior vice president of Cigna Systems, argued for the buy-the-company strategy. "We got the software for a fifth of what it would have cost to do it ourselves," he says. "We also cut the development time to about a third. We got tremendous leverage."

EVERYONE LOOKS FOR SYNERGY

In addition, Wills says, the two companies should be able to complement each others' marketing efforts. If Cigna's customers decide they eventually want to administer their own flexible benefit program, "we can say okay, we have a company that sells a system identical to the one we use. We guarantee you'll need no conversion." Dyer, Wells, he says, can recommend Cigna to some of its clients. "This is called synergy. It's what all companies are looking for," Wills says.

The plan for Dyer, Wells also includes expectations that the software firm will eventually help market software Cigna develops internally, or develop software that the insurance company's overburdened in-house programmers don't have time to produce. Neither goal has been attempted yet, Wills says. But, he claims, the flexible benefits software Cigna got was itself worth the $6.8 million it paid for Dyer, Wells.

The Chicago-based Bell operating company Ameritech, maker of the deal-of-the-year, is far less specific about its ideas for ADR. Reporters probing for details "come away frustrated," admits a spokesman at Ameritech's public relations division. "It's fair to say there are a hell of a lot more questions than answers."

Ameritech executives say they wanted a computer connection because communications and computerization are becoming more and more interwined. ADR was attractive, they say, because it's a premier company in systems software.

"With applications software, all we'd bring to the merger is money," says Robert Prothero, vice president for information systems technology at Ameritech. "In systems software we do have expertise." Prothero admits, however, that Ameritech has not yet figured out where the ever-popular synergy will come from. In contrast, NYNEX, the New York-based Bell operating company, began shopping for software firms earlier than Ameritech. It says it wants to be a "a significant player in applications software systems integration—a very significant player." This year NYNEX Development Co. purchased Telco, maker of telecom management systems, for an undisclosed price. Last year it bought Data Group, creator of Field Watch, software used in customer service/field service for minis, micros, and mainframes.

"We'll be buying others," promises Gar Selig, vice president for development at NYNEX. The new acquisitions are not intended as suppliers of internal NYNEX needs, and will be operated in a hands-off management style, he says.

"Hands-off" is second in popularity only to "synergy" in the vocabulary of corporate executives who acquire software businesses for the parent company. It's the code word for avoiding all the problems that come when a big, mature, conservative company buys a smaller software business that counts flexibility and creativity as its strengths.

Observers wonder how many small software firms will be able to avoid being smothered by a large bureaucratic overseer, no matter where it promises to keep its hands. "Cigna . . . wonders about that," laughs Travers Wills, who is a little atypical because he admits that it's problematic when a giant corporation becomes parent to a growing young software firm. "It's very difficult. I don't think cultures will ever be the same. The benefit [of Dyer, Wells] is its spontaneity, flexibility. You don't work for a software company if you're risk-adverse."

A self-described "corporate creature," Wills says he finds it difficult to relate to Dyer, Wells's "lack of process. They're inclined to jump in and try things." Lately, for example, Dyer, Wells has been lobbying for permission to branch off into a new venture, as yet undisclosed. Even though Wills thinks the idea is a good one, the two sides are finding it difficult to arrive at a decision together. "I'm very excited about [the new venture], too, but when I poke at it, they give me no reasons," Wills says. "They're very frustrated at my prodding and I'm very frustrated by their lack of follow-through."

Wills volunteers that Cigna made a mistake early on in trying to manage too closely. That posed an immediate image problem for Dyer, Wells, which had other insurance company clients for Flextrax. For instance, Travelers is a Dyer, Wells client, Wills says. Any indication that Cigna had a privileged relationship could have been fatal to Dyer, Wells's marketing efforts, Wills says. "I don't know how they'd sell against that." Now, he claims, the company has backed off.

"When I started, I thought I'd run this firm closer to Cigna. But now we have a true arm's-length relationship," he says. Cigna now pays the going rate for services from Dyer, Wells and the two companies sometimes compete for the same jobs. "For the purposes of management," says Wills, "I'm the only contact between the two companies."

At NYNEX, Selig claims there have been no problems at all between the corporate cultures. "We know what we're doing," he states.

Alan Atkinson, president and ceo at Data Group, Burlington, Mass., says he, too, is happy with the relationship. According to him, Data Group is getting a needed capital infusion, access to NYNEX's state-of-the-art technology, and a chance to fit into the phone company's "total solutions" program, which offers customers a wide variety of different telecommunications services and will, Atkinson hopes, be the source of lucrative new business for Data Group.

What does NYNEX get out of the deal? The chance to expand beyond the regulated telephone business and the infusion of the kind of entrepreneurial mentality a mature corporation often lacks, Atkinson says. "They need companies with lean-mean spirit."

What lies ahead for the software industry? More of the same, according to just about everybody. "It's a very fragmented business, so there's a great deal of opportunity for people who are clever to try to put something together," says analyst Miller.

There are always new businesses to buy. Beyond the forces of synergy-hungry insurance companies and investment bankers looking for a fee lies the seemingly immutable fact about the software industry: it offers lots of opportunity to entrepreneurs, thanks to an entry level that still puts low risk on failing and hands out extremely high rewards to those who succeed—and that's another reason why, like crabgrass, new software companies keep popping up all over. ◉

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No one expects ISDN to arrive tomorrow. But will it be like waiting for Godot?

WAITING FOR ISDN

by Dana Blankenhorn

The integrated services digital network is coming, but not quite as soon as its boosters thought just a few years ago.

Major tests of ISDN-compatible switches have been delayed. Major portions of the standards underlying ISDN have yet to be agreed upon. European and American views of the final standards still differ substantially.

AT&T, Northern Telecom, and others continue to beat the drum for ISDN, but the sound is beginning to seem hollow. "In a way, ISDN is just a label for a natural evolution that has to take place," says T. Doane Perry III, senior research analyst in telecommunications for International Data Corp., Framingham, Mass. "What is amazing," he adds, "is that it has become such a big buzzword, and such a big piece of hype."

ISDN is the name given to an emerging set of standards for a global telecommunications network that will eventually deliver voice, data, image, and text in digitized form (see "ISDN: What It Is," and see also "The Integrated Service Digital Network," Dec. 1, 1984). There may be competing ISDN networks within national boundaries, but from the user's point of view, ISDN will look like a single, uniformly accessible worldwide network.

In 1984, over 30 recommendations primarily defining the customer interface to ISDN were adopted by the International Telegraph and Telephone Consultative Committee (CCITT) in Geneva, the group that is setting ISDN standards. Interim decisions have been made since then, but the next major batch of standards, which will provide refinements to the interface and more details on internal network functions, are due to be issued in 1988.

By now, more than one company has put a lot of marketing muscle behind the idea. Last March, AT&T based its entire booth at the Interface '86 data communications show in Atlanta on ISDN. "We have got to provide a technology environment

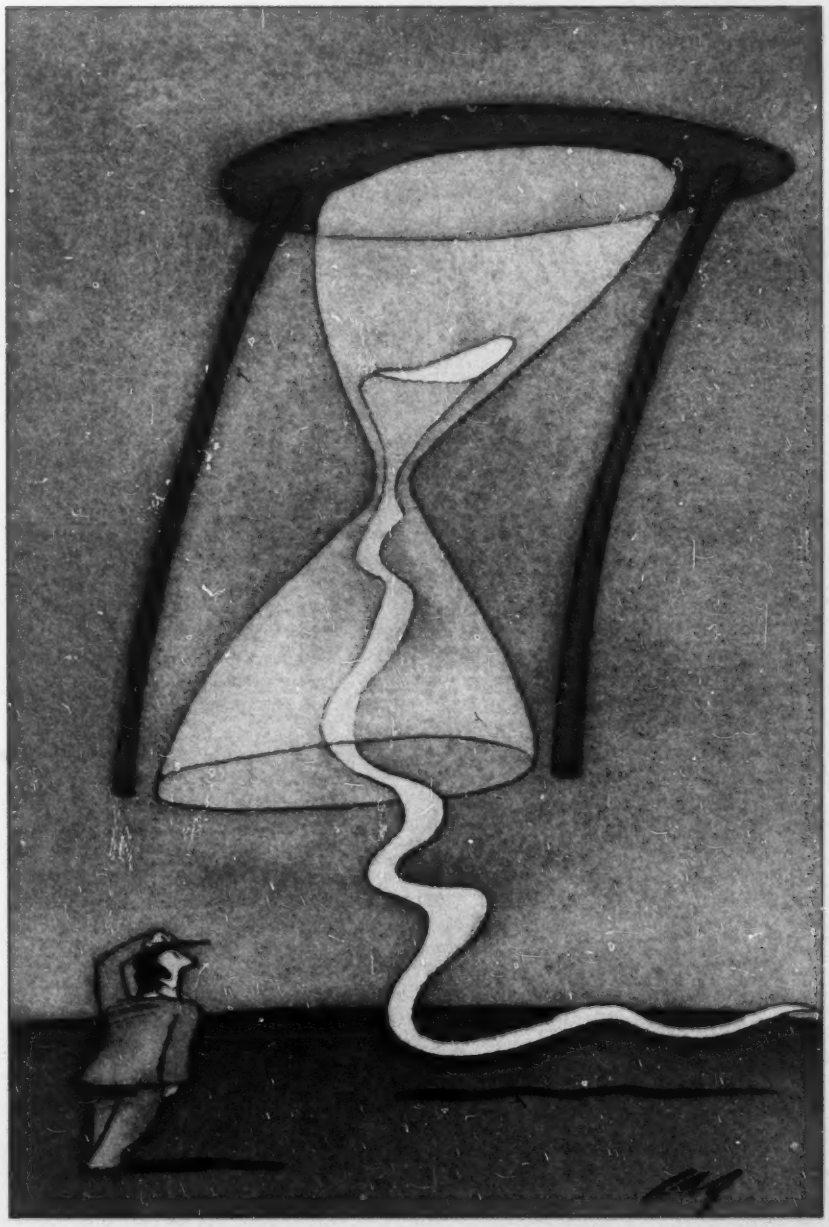

ILLUSTRATION BY RICH GOLDBERG

"What's amazing is that it's become such a big buzzword and such a big piece of hype."

marked by pervasive intelligence," said James Olson, AT&T president, in his keynote address to the Interface crowd.

For the telephone companies, ISDN represents long-term strategy. For their suppliers (see Fig. 1), ISDN is a multibillion dollar opportunity. For users, ISDN today mostly means hard questions without easy answers. For most, ISDN holds simply the far-off promise of reducing communications costs by eliminating the need for separate networks and some related transmission equipment, like modems.

Some observers are troubled that major portions of the specifications for ISDN remain unsettled, a situation that has led people to joke that ISDN really means "I Still Don't Know." CCITT is now under the gun to reconcile European and American schemes for, among other things, international connections.

The role of IBM in a future global network is another unknown (see "IBM on ISDN"). While endorsing the ISDN concept, IBM has stressed, through its Rolm subsidiary, that it's premature to talk of ISDN as if it were a living reality. With its 16.6% interest in MCI Communications, however, IBM could be positioning itself to participate no matter how the ultimate standards are defined.

FIG. 1

THE ISDN HORSE RACE

COMPANY	ESTIMATED 1986 SWITCHING EQUIPMENT SALES ($MILLION)	CAPTIVE DOMESTIC MARKET	CAPTIVE CHIP MANUFACTURING
AT&T	4,000	No	Yes
CIT Alcatel	650	Yes	Yes
DSC	130	No	No
Ericsson	1,570	No	No
Fujitsu	450	Sort of	Yes
GEC	400	Was	Yes
GTE	1,100	Yes	Yes
Harris	30	No	Yes
Hitachi	300	Sort of	Yes
IBM/Rolm	700	No	Yes
ITT	2,000	Some	Yes
Mitel	350	Partly	Yes
NEC	1,400	Sort of	Yes
NT	1,800	Yes	Yes
Philips	200	Hardly	Yes
Plessey/Stromberg	450	Was	Yes
Siemens	2,900	Yes	Yes

Source: International Resource Development Inc.

A LONG, EXPENSIVE PROCESS

This much is clear. Building ISDN will be a long and expensive process. The first steps are being taken by telephone companies right now. They're upgrading roughly 12,000 central offices with the latest digital switches, which will be able to handle ISDN features when they appear. For digital switch-makers in the U.S., the ISDN game will be won or lost in the next few years.

We're talking here about switches that cost from $1 million to $50 million each, like the AT&T 5ESS, the Siemens EWSD, the Northern Telecom DMS-100, the GTE GTD 5-EAX, and the NEC 61E.

AT&T and Northern Telecom currently have most of this business. Firms like Siemens, NEC, Ericsson, GTE, CIT-Alcatel, DSC, and Stromberg-Carlson want a piece of the action.

These switches are merely "ISDN capable," says Jean Buffham, a research analyst for International Resources Development, Norwalk, Conn., because ISDN standards have not been fully settled yet. The switch-makers "are banking on the fact the architecture is open enough to hook up to future standards," she adds.

To AT&T, the ISDN-capable 5ESS switch is critical to its success. But the company has already stumbled with this product. Customers were told in February the 5ESS would be delayed until December 1986. AT&T has suggested that the postponement was caused by complexities inherent in the switch software and by such projects as its obligation under the breakup agreement with the Justice Department to make network modifications necessary to guarantee long-distance competitors equal access. AT&T spokesman Sue Fleming says further "delay will come in the speed with which they get additional ISDN features."

For Northern Telecom, the DMS-100 switch, of which over 1,000 have been installed, has come to be a flagship product. It's an opening through which the company hopes to move more PBXs, voice/data terminals, and other ISDN-compatible office equipment. More than a year ago, Northern Telecom began shipping a software product called Integrated Business Network (IBN), which offers services similar to AT&T's Centrex. "Our ISDN trials will let us reuse that software, so we'll have compatibility between ISDN and IBN," says Ian Sugarbroad, general manager for ISDN at Northern Telecom's offices in Research Triangle Park, N.C. "We'll start our trial a month later than AT&T, but we'll have more applications."

Ericsson of Sweden, CIT-Alcatel of France, and Stromberg-Carlson, a subsidiary of the U.K.'s Plessey, are each preparing to market ISDN switches in the U.S.

Siemens, already a major contender in the European market, believes its EWSD has a good chance to secure a foothold for the company in the huge North American market. The West German firm is now discussing a possible joint venture with GTE for U.S.-made digital switches. IRD's Buffham expects more joint ventures. Companies won't be able to do it alone, she believes, because "the outlay of cash to put together these operations is too" great.

For DSC, formerly called Digital Switch Corp., digital switching is the whole ballgame. The Dallas-based company is much smaller than its rivals (1984 sales: $352 million). Its survival depends on selling to niche market players like Continental Telecom and United Telecom, and to long-distance firms like US Sprint and MCI.

The most important U.S. customers of the digital switch-makers are the seven regional Bell holding companies and their telephone subsidiaries, which will be conducting most of the domestic testing of the new generation of ISDN-capable digital switches. They will all test ISDN switches between now and the end of 1987. Analysts expect most of them to settle on three suppliers each. That way they get the benefits of competitive sourcing but don't have to handle too many redundant spare parts.

The tests, however, are modest. Ameritech is planning a widely publicized test at McDonald's headquarters in Oak Brook, Ill., this December. Originally scheduled for December 1985, it was de-

layed after AT&T postponed the release of its 5ESS switch. Bell Atlantic is doing customer demonstrations and market research in four cities. NYNEX is testing Siemens switches and conducting market research in New York City.

Pacific Telesis will test switches in San Francisco and San Jose, and run a test it is calling Project Victoria in Danville, Calif. Project Victoria involves putting five data and two voice channels into an ISDN phone line that has roughly half the bandwidth that is envisioned under ISDN.

Southwestern Bell will test Northern Telecom and AT&T switches internally at its St. Louis headquarters. U.S. West will demonstrate four brands of switches for the International Switching Symposium in Phoenix next March. BellSouth is connecting two brands of central office switches, Northern's and AT&T's, to customers in Atlanta. BellSouth doesn't call its move a test; rather, it's described as a "roll-out."

ISDN EQUIPMENT TO TOUR

This summer, phone customers may see the kind of equipment ISDN will require. Both Siemens and Northern Telecom will send trucks loaded with ISDN-like equipment on tours of telephone company offices for hands-on demonstrations.

Wisconsin Bell sponsored a similar truck tour for Siemens last year. Scott W. Augerson, senior product manager for Siemens in Boca Raton, Fla., says running the facsimile machines at 64Kbps "really shows them the potential."

What is that potential? One 64Kbps B channel (the standard channel for regular voice and data transmission in ISDN) is more than enough for clear, digitized conversation. The fastest pc modems are moving data at only 10Kbps to 20Kbps. At 64Kbps, pages run through a facsimile machine as fast as through a photocopier.

Still, there are complaints. "The ISDN trials do not consist of the movement of data through the network," says communications consultant Gerald Ryan of Connections Inc., Bridgewater, Mass. "They consist of interfacing with some switch, and what takes over at that point is the normal transmission of data. The full implementation of ISDN as a network data transfer is nowhere near trial."

While the switches being tested by the phone companies are up-to-date, upgrading these switches to provide ISDN functionality will require additions to software and, in some cases, new plug-in boards. When such switches are installed today, analog-based POTS (plain old telephone service) is still the rule. As we've seen, even the trials are limited. Fact is, while the basic rules of the ISDN game are established, the i's aren't all dotted and the t's aren't all crossed yet on the standards.

Before selling chips and connectors for linking PBXs, pcs, or fax machines to an ISDN network, such equipment must be able to interpret signals received through the D channel (the ISDN channel reserved for passing control messages). If you're talking on the phone today and have call-waiting, for instance, you'll hear a beeping tone for the second call, a tone that can kick a modem off-line. This is called "in-band" signaling, and will disappear under ISDN.

To use the ISDN D channel, PBX equipment and office machines must be modified to accept "out-of-band" signaling—but standards for this are not final.

NOT EVEN SHAPE OF PLUG SET

Study Group 18 of the CCITT hasn't settled on the shape of plug that machines will use to connect to ISDN, let alone the logical, software-based connections. There are seven different logical protocol levels involved in passing control signals to customer machines through an ISDN D channel. The first three, based on the Open Systems Interconnection (OSI) reference model, appear set. But all must be settled before manufacturers install ISDN chips or connectors in new products, let alone before plug-in board-makers start fitting pcs or facsimiles or telex machines to work with ISDN.

"At present the standards are not set, so we're trying to find a graceful transition in the present trials," says Patrick Bonds of Northern Telecom. "There will be hybrid signaling in the interim."

Most of the other unsettled ISDN standards questions involve basic differences between current North American communications standards and those used in Europe.

• Will the software required by various interfaces between the customer and the network be located in the customer's equipment, or at the telephone company's central switching station?

This central issue is part of the great tug of war between AT&T and IBM. If the software is placed in the customer's equipment, then widespread implementation of ISDN will depend on the availability of user devices made ISDN-capable with special logic chips. In that case, specific standards will have to meet with wide agreement.

If software implementing ISDN interfaces are lodged in the switch, fewer changes will be required of customer-premise equipment to implement ISDN.

• What error detection scheme will be used within ISDN?

This relates to differences between European and North American networks. Europeans use 31 clear 64Kbps channels,

ISDN: WHAT IT IS

The term ISDN is used to refer to both the standards set by the International Telegraph and Telephone Consultative Committee (CCITT) and to the network that is supposed to be formed based on those standards. By the year 2000, telecommunication customers should be able to send data, sound, pictures, or print in the same way, through the same type of system, anywhere in the world.

Today many central offices along the long distance phone networks exchange digital signals with each other, but most receive analog signals from telephones. With ISDN, all transmissions to and from end-user devices will be digitized, either directly or after conversion by such customer-premises equipment (CPE) as a digital PBX. The ISDN model is essentially an end-to-end switched digital telecommunication network.

Intelligence and capacity are two key ideas behind ISDN. There are two kinds of ISDN access service: basic and primary.

Basic access service is referred to as "2B+D" and consists of two 64Kbps B channels and one 16Kbps D channel. The letters refer to the function, not bandwidth, of the channels. The B channels are used for all data other than control messages. The D channel is the conduit for out-of-band control messages, and is used to specify, for example, what devices are plugged in at either end of a connection.

The control messages give the network intelligence. As Scott Augerson, senior product manager for Siemens Information Systems, Boca Raton, Fla., explains, "You'll have one number—no need for separate numbers to the fax, telex, pcs, etc. The network figures out which device the call is for."

Primary access service will be offered to commercial customers of an ISDN who want to hook up their PBXs or LANs. It consists of multiple 64Kbps channels. There will be two "primary access" connections: one will consist of 24 channels, the favorite of North American designers, and the other will have 31 channels, the preference in Europe.

The 24-channel connection, or "pipe," offers a 1,544Kbps bandwidth divided into 23 64Kbps B channels and one 64Kbps D channel. The 23 B channels can be combined to deliver a digitized tv-like signal; portions of it can be used to deliver lower-level Picturephone or teleconferencing service; or the "23B+D" pipe can be used to augment even the networks and satellite networks businesses already have. This capacity is possible by using copper, but its ubiquity will be made possible as copper is replaced by fiber optic cable.

—D.B.

IBM ON ISDN

ISDN is part of the larger poker game between AT&T and IBM for leadership in the information industry. In this battle, however, IBM does not hold all the aces.

Big Blue's preference for proprietary standards is threatened by the all-pervasive nature of ISDN. While IBM representatives sit on ISDN standards committees, and its Rolm subsidiary is a major player in the digital PBX market (a major ISDN battlefield), Big Blue is, for the most part, on the outside looking in at ISDN. For now.

But no one is yet calling ISDN a living reality. "What we've said in the past is that it will be the late 1980s or early 1990s before real ISDN products appear," says Rolm spokesperson Sherry Fahey.

In its Rolm subsidiary's "ISDN Position Statement" published last December, the firm emphasizes the importance of Rolmlink, "a proprietary desktop interface similar to the ISDN basic (2B+D) interface," calling it "the first high-volume implementation of an ISDN-like product in North America." The statement adds that IBM will continue support for non-ISDN standards, including the IBM token ring network, SNA, and X.25.

"This philosophy will allow a Rolm CBX to support both ISDN primary (23B+D) and basic (2B+D) interfaces in addition to the non-ISDN connections, ensuring protection of investment already made," according to the statement (see "ISDN: What It Is"). CBX is the brand name of Rolm's entry in the PBX market.

The statement goes on to emphasize that ISDN standards are not fully in place, that there are differences between European and American ISDN, and that "multiple ISDN networks could evolve in North America" from AT&T, Bell Operating Companies, MCI, GTE, and others.

Rolm's position echoes those of analysts who say more user input is needed in ISDN. "Users have not, to date," the Rolm position paper continues, "participated significantly in the standards process and the usefulness, practicality, and bottom-line cost benefits of ISDN are not clear. This viewpoint has been expressed by many users in forums across the country. The applications or services that ISDN will provide are not defined and the benefits to customers remain very hazy."

What's not hazy is IBM's desire to offer those benefits. In selling its money-losing Satellite Business Systems subsidiary to MCI Communications, Washington, D.C., last year, IBM acquired a 16.6% stake in MCI. As a long distance company, MCI will have to handle ISDN services no matter what standards are finally set. John Hauser, an MCI spokesman, agrees, and says the firm is steadily increasing its datacom workload as ISDN approaches. "Our MCI DataTransport packet-switching is an ISDN service. We are working with the standards-setting committees and we'll be ready to implement full ISDN when it arrives."

Recently, IBM lost a battle when the CCITT decided against adopting SNA layers as part of the OSI protocol (see "Benchmarks," April 1, p. 24).

But the issue remains important. "The fight is over how ISDN and SNA work together," says Fred Knight of the newsletter *ISDN Strategies*.

While IBM will not comment on future product announcements, analyst Frank Dzubeck of Communication Network Architects Inc., Washington, D.C., says products developed by IBM Europe will come out this year that will illustrate its strategy: "IBM/Rolm will release an ISDN interface for the PC with a 64,000-baud [64Kbps] channel for data transmission through the Rolm CBX," he says.

"What IBM does in the future will be very important," says Buffham of IRD. "They're a big question mark at this point. Are they going to make a play for the telecommunications market and come out with a digital switch? If not, what are they going to do with Rolm?" Consultant Gerald Ryan of Connections Inc. says IBM's recent decision to join the Corporation for Open Systems proves the company will eventually play ball on the CCITT's terms. "My impression is that IBM is moving very, very quickly, not slowly, in the way they have made themselves available," he says.

When the ISDN game gets serious, in other words, expect IBM to be there.

—D.B.

while American networks have 24 channels, each with 56Kbps of bandwidth and 8Kbps for in-band messaging. The question, according to Sugarbroad of Northern Telecom, is how Americans will operate at 64Kbps clear—without the 8Kbps in-band message bandwidth. The specific schemes, B8ZS (binary 8 zero substitution) and ZBTSI (zero byte times slot interchange), are incompatible techniques for handling errors that result from too many 1s or 0s in a row. Once these questions are settled, there will be more, adds Northern Telecom's Sugarbroad.

John Newell, who heads data interfaces for AT&T research and development, insists the important standards work is done and that ISDN is going forward faster than critics think. "Silicon VLSI suppliers feel the standards are sufficiently defined to do chips in support of these interfaces, including American Micro Devices (AMD) and Intel in the U.S., and Siemens, Mitel, and Ericsson internationally."

Newell also minimizes the remaining standards issues. "I'm not sure of the status of the plug, but the electrical characteristics, the transmission modes, the data formats, and their speeds have all been settled, and people who are knowledgeable feel domestic RJ-11 jack and plug combinations are perfectly adequate to support those transmissions." Nonetheless, since many decisions haven't been made yet, worldwide compatible designs can't be set.

GETTING READY FOR ISDN

Right now, the market research being done by the phone companies tells them to go full speed ahead. "One study we did with a customer with 300 potential terminals estimated $10,000 per month could be saved by simplifying office moves" with ISDN, says Paul Bayliss, director of market planning and management for AT&T Network Systems. "Banking, insurance, financial services, health care, high-tech manufacturing, and universities all have high potential as markets."

Analysts admit ISDN sounds real exciting but they're suspicious that the current excitement is much ado about nothing. IDC's Perry says that the only thing users need to know right now is that their phone lines are going to get better.

A key question for users and vendors alike is the extent to which ISDN will require that computers and telephone equipment adapt to some new universal standard.

Perry, for one, doesn't see that coming. "What won't happen is the universal standard that lets you switch among vendors. X.25 [the CCITT standard for packet-switching network protocols] didn't provide that—Tymnet's still different from Telenet—and ISDN won't do it either."

In the transition to ISDN, new problems can result. Fred S. Knight, editor of the newsletter, *ISDN Strategies*, explains one. "The conversion will effect T1 multiplexing. Data are formatted for T1 multiplexing through a format called T1-D3. T1-D3 and ISDN are not the same, so if AT&T can offer T1 speeds in the ISDN format, with software in their PBXs which formats data to the ISDN format, what's it do to people selling T1 multiplexors?" The lack of clarity in such matters assures the drumbeat of ISDN arguments will continue.

Of course, the basic question is what should you do about ISDN? "The main thing users should do is assure themselves that their planning fits into ISDN somehow," says Tom Super, assistant director for strategic technical planning at NYNEX, White Plains, N.Y. The one thing you probably should not do about ISDN is lose any sleep over it, unless you sell big digital switches for a living, or have to buy one for your private communications network. The rule is walk, don't run, to tomorrow. ◉

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